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The Red Cedar.

THE Red Cedar, which is not a Cedar at all in the botanical meaning of the word, but a Juniper, is one of the commonest and most widely distributed trees of North America. Indeed, it is not easy to recall any other coniferous tree which inhabits such an extended area, with the exception of another plant of the same genus, the Juniperus communis, found in various forms in all northern countries, and the great Siberian Spruce, Picea obovata, which ranges from the eastern borders of Russia to the Manchurian shores of the Pacific Ocean, and to central China. The Red Cedar is equally at home on the dry gravelly hills of New Brunswick and New England, on the northern shores of Georgian Bay, in the fertile valleys of Pennsylvania, on the limestone hills of eastern Kentucky and Tennessee, where it forms, with stunted shrubby growth, great forests or "Cedar Breaks"; in the swamps of the Florida peninsula, and on the rich bottom-lands of the Red River and its tributaries, where it grows to its greatest size. Less common in the west than in the east, the Red Cedar is apparently as much at home in one region as in the other; it is scattered over the eastern slopes of the Rocky Mountains of Colorado; and when the Mission of Santa Fé was established the Spanish priests might have seen it on the cliffs above the stream that enabled them to change a desert into a garden; it flourishes in northern Arizona, where the melting snows of the Rocky Mountains pour through the mighty chasm that divides the Colorado plateau, and it grows on the borders of lakes and streams in northern Montana and Idaho, and on Vancouver's Island.

The habit of the Red Cedar is as varied as the regions it inhabits. Sometimes it is bush-like, with many spreading stems, and at others it grows nearly a hundred feet tall, with a beautiful straight trunk four or five feet in diameter; sometimes all the branches are wide-spreading and form a symmetrical round-topped head; at others they are pressed close to the stem and the tree is pyramidal with a narrow spire-like top. These varieties of habit do not appear to be governed by any recognized conditions of environment. Often pyramidal trees grow side by side with round-topped or bushy ones, and in old age they all appear to lose their pyramidal habit and to become round-topped. The pyramidal habit, however, is, perhaps, rather more marked and constant in fertile lands, such as are found in the valley of the Hudson River and in eastern Pennsylvania, than it is in New England, although pyramidal trees are common there. Of remarkable constitution and possessed of great powers of adaptability to varied climatic conditions, the Red Cedar only displays its full size and develops its greatest value in the warm and humid atmosphere of the south, and at the north and in the far west it looks as if it selected some particularly exposed and wind-swept hill for its home in order to show its toughness and indifference to the comforts of life.

The earliest European settlers on the Atlantic seaboard delighted in the Red Cedar, which reminded them of some inhabitant of their Old World gardens, and in its bright red fragrant wood which the Indians had known and valued before them; and the narratives of the old voyages and settlements usually describe the Cedar which was often included in the lists of treasures yielded by the new-found land. They did not exaggerate its value as they did that of the Sassafras and many other products of the American soil. There is no tree in America that will grow better fence-posts, for the wood does not decay and insects do not molest it. A well-selected Red Cedar post will last an incredibly long time in the ground; and for the sills of buildings placed immediately on the soil no wood is more valuable. Moths flee from its pleasant pungent odor, and every good housekeeper knows the value of a red cedar chest, or a closet lined with this wood. Red cedar is the wood of lead pencils; and practically the wood in all these indispensable articles, at least in pencils of good quality, is the wood of this tree from Florida, where there are great factories belonging to German manufacturers, devoted to cutting up cedar wood into pencil stock. Every artist in all the civilized world, every man of letters, every school-teacher, all the bankers, lawyers and other men of affairs, the men and women who control the world, and all the school-children who are going to control it, hold every day in their hands a piece of this wood. It would be interesting to know what proportion of these men and women, the most intelligent and best-educated of the human race, knows anything of the origin of these little cylinders of wood, of the character and appearance and of the name even of the tree that builds them up in its long life of slow accretions.

It is not our purpose to speak now of the botanical peculiarities of the Red Cedar, the Juniperus Virginiana of botanists, because they are perfectly well known to every one who is interested in trees in their scientific aspects, but of its horticultural or decorative value as an ornamental plant, because it does not seem to be fully appreciated or recognized in American plantations, at least in the eastern states, although in the west a few years ago it was largely grown by nurserymen and planted in considerable numbers on the plains and prairies of the Missouri River basin. In all the northern states the Red Cedar can be made to take the place in formal gardens of the Cypress, to which the gardens of southern Europe owe so much of their charm, and which cannot be grown in our severer climate. If it is desired to produce certain effects in a garden by the use of trees that are formal in outline, the Red Cedar will produce this effect better than any other tree that is hardy here; and if trees cut into fantastic shapes such as delight the Chinese or the Japanese, from whom the Dutch learned this fashion, no tree bears with less injury than the Red Cedar the annual suppression of its growth under the gardener's shears. In natural gardens also the Red Cedar can be made to play a useful, and sometimes an important, part, as no tree is better suited to enliven a broken, rocky hillside or to crown its top with its dark green foliage, which in autumn is studded with bright blue berries. Other coniferous trees with pyramidal habit, like the Arbor-vitæ, are often planted in such situations; but the Arbor-vitæ is a gregarious tree and an inhabitant of

swamps and low river-banks, and when it is made to stand out alone on a hill it never looks at home or in harmony with its surroundings, while the Red Cedar, of all our trees, most easily fits into its place in the landscape, and, perhaps, no one ever saw a Red Cedar that looked out of place in connection with its associates in any American sylvan landscape. As a hedge-plant the Red Cedar has not proved very successful; the plants grow too slowly for the impatient American, who wants his hedge to grow as rapidly as a carpenter could build one with boards, and the branches often die out, making here and there ugly gaps.

Like most other trees, the Red Cedar is easy to raise from seeds when the person who undertakes to do it understands its peculiarities. The stone enclosed in the fleshy berry of the Juniper is very thick and hard, and it takes a long time to soften so that the seed can get out and begin to grow. Planted in the ground in the ordinary manner a Juniper-seed will sometimes lie for years without germinating, and the way to treat them is to soak the berries thoroughly in warm water as soon as they are ripe in the autumn, mix them with sand, bury the whole mass in the ground in some place where they will keep moist during the following summer, and then plant them either in the autumn, a year from the time they were gathered, or in the following spring. Treated in this way the seed will germinate in a few weeks after they are planted, and produce strong plants the first year, which will be six or eight inches high at the end of the second season, and ready to transplant. Nurserymen do not raise Red Cedars very often now, for there is no great demand for them. Young plants can be transplanted from old pastures, however, or from the sides of walls or fences, where the seeds dropped by birds germinate in great quantities, producing the long lines of Cedar-trees which are conspicuous and beautiful features of the landscape in the northern and middle states.

The Red Cedar is a long-lived and hardy tree, and if any man has a fancy to plant for posterity or to preserve his memory in a tree, there are few trees that he can plant with greater assurance of attaining the object of his ambition.

The illustration on page 65 of this issue, made from a photograph, for which we are indebted to Mr. Charles S. Bradford, Jr., represents a venerable Red Cedar-tree of a common form growing near Wawa Station, Delaware County, Pennsylvania.

Black Locust in the West.

So far as I know, the only place west of the Mississippi where Black Locust, Robinia Pseudacacia, is indigenous, is in Arkansas, where there is a heavy rainfall. But the species will flourish under widely different conditions of moisture, and it succeeds quite as well, even in high land, as any other tree as far west as the one hundredth meridian. It will not endure excessive cold, however, and it is not advisable to plant it north of central Iowa and the Platte River, in Nebraska.

Black Locust has been extensively planted in the prairie portions of Missouri, and in Kansas it is a favorite tree, owing to the great variety of soils in which it succeeds, its ability to withstand drought, and the superior excellence of its wood for post timber, and for all uses requiring contact with the soil. It is the hardest and most durable broad-leaved timber that can be grown in this climate, and as fencing is an important problem in the west, there is economy in including a good post timber in the shelter belt plantation. Black Locust seedlings have been extensively distributed by the Kansas Commissioner of Forestry. At the State Forestry Station, Ogallah (longitude 99° 40′ W.), this tree is grown in high prairie, and trees seven years planted are as healthy as any on the grounds. The annual rainfall at Ogallah is about twenty-four inches. At the Kansas Agricultural College, Manhattan, Black Locust and Catalpa have been used as nurse-trees for Oaks. The Locusts have not done especially well in this mixture, growing about as rapidly as the Catalpa. The Locust is a light-demanding tree, and should be planted in mixture with good shade-enduring kinds, such as Russian Mulberry and Wild Cherry. The trees should be set close—not more than four feet apart both ways, and three feet is better. This close planting will force them tall, and as in post timber length of trunk is a most important consideration, the importance of plenty of shade-making trees and close planting will be recognized. The Locust should not constitute more than one-fourth of the plantation. Mixed planting will also tend to lessen the danger of damage from borers, which cause much injury to trees of this species.

Washington. *Charles A. Keffer.*

California Experiment Stations.—II.

The Forestry Station at Santa Monica, in southern California, occupies a most interesting and picturesque site. The town of Santa Monica is, perhaps, as well known as any part of the Californian seacoast, because it is particularly accessible from Los Angeles by railroad, and has become the leading watering-place between Coronado and Monterey. A long sweep of seashore, bold, high cliffs, with an almost level plain above them, rising north and north-east to the bluest of mountain ranges, and traversed by deep barrancas or straight-sided cañons, such is the general aspect of the great Santa Monica rancho. Fifty years ago a hundred thousand acres here, the estate of an old Spanish family, supported vast herds of horses and cattle. Then came the railroads—the American town-builders. Senator Jones, of Nevada, and others bought the ranch, founded the town, pushed out an immense wharf a couple of miles away, at Port Los Angeles, where the steamships land, and Santa Monica, upon the frostless bluff overlooking the blue Pacific, began to take shape. Now one sees there rows of tall Bananas, heavy-fruited, all winter long; Tacsonias and Passifloras grow and bloom, and semi-tropical gardens surround costly cottages on every hand.

The greatest and deepest barranca in this entire Santa Monica plain is that known as the Santa Monica Cañon. It is not really a cañon in the strict interpretation of the Spanish word, which refers to mountain ravines, but more nearly conforms to the Spanish idea of a barranca, a wide cleft across the plain from the mountains to the sea. In reality there are two large barrancas there, running in a direction somewhat parallel for four or five miles, although they are sometimes close together, and at other times wide apart. The narrow tongue of land between them extends to within an eighth of a mile of the ocean. The two streams of water that flow through these deep and well-wooded depressions unite at the foot of this gradually sloping tongue of land that overlooks the seabeaches. Here, on the sides and summit of this narrow central plateau, between two deep gorges, the Santa Monica Forestry Station is situated. It is almost completely hidden from the town and the watering-place. It is greatly sheltered from storms, and yet the view from its heights is wonderfully extensive.

To the tourist driving northward from Santa Monica, along the cliff overlooking the Pacific, the dry level plain seems to stretch unbroken, except by slight depressions, for twenty miles. Suddenly, by an old adobe ruin, he pauses, at the verge of a cliff; a hundred and fifty feet below, the Santa Monica ripples over its pebbles and through its groves of giant Sycamores, which rank among the noblest in southern California. Half a mile beyond, the plain continues again on the same level; between the two divided fragments a narrow tongue of rocky land projects and sweeps in long curves downward to the Sycamore groves. Eastward, along the ascending lines of the vast chasm, are darker and larger masses of forest, Walnut, Oaks, Cottonwood and other groves of Sycamores. Beyond, and at points of vantage on the sides of the descent, are plantations and avenues of various species of Eucalyptus. The cultivated fields cease at the edge of the gorge, and only begin again beyond the further cliff; the space be-

tween, painfully cleared in spots, and planted with grass and corn, is for the most part wild land thickly overgrown with lesser forms of vegetation, except where richer soil or the nearness of water has enabled native trees to gain a foothold.

The twenty acres belonging to the forestry station, a little arboretum tract, with hardly any waste upon it, extend from the bottom of the northern Santa Monica cañon, up slopes and across levels to the very top of the mesa, on the same plane as the town itself, and look down from thence to the bottom of the south cañon. Three distinct levels and two half-levels, with their connecting slopes, not too abrupt for planting—such is the charming topography of the station lands. Given five acres more of rough, stony western frontage sloping to the sea, and ten acres toward the east to carry the boundaries to natural lines, and the forestry station need ask nothing else in the way of land endowment.

The soil is rich and varied, suitable for good tree-growth and easy to till. Frosts, noticeable on the lower part of the tract, lessen as one ascends. Climatic observations are being kept on each of the three principal levels of the station.

According to the reports of the late State Forestry Board, the Santa Monica Station was founded December 20th, 1887. At that time Mr. Abbot Kinney was chairman of the Forestry Board, and I think it probable that he was mainly instrumental in the choice of the beautiful tract now occupied by the station. A fine collection of some forty species of Eucalyptus and Acacia was planted near the foreman's cottage, and these are now beginning to make a fine show. This collection, and also many choice single trees and some avenue work, were done during Commission days. The University has added to the collection, has cleared a good deal of brush-land, has greatly developed the water-supply, and is establishing a choice nursery of rare trees. All this takes time, and it may be several years before the scientific results of observations upon tree-growth here afford much data for publication.

Mere lists of species planted are seldom valuable. The phenomenal range of soil and climate offered to the forester here can best be shown by a few memoranda:

On the lowest and coldest level, three or four feet above the creek-bed, are Camphor-trees, several Hakeas, a Banana, Dracenas, an immense mass of the Hawaiian Taro, Caladium esculentum, growing in the moist soil that receives the overflow from a hydraulic ram used to lift water to the dwelling-house, a hundred feet higher. Tender species of Eucalyptus and other trees are grown in seed-beds here. The soil is a light sandy loam, mixed with leaf-mold from the Willows, Cottonwoods and Sycamores that shelter and half surround the place.

The bluff between the lowest level and the main or cottage plateau is heavily wooded except where nearly perpendicular. It is moist, with springs and green with vines and beautiful undergrowth. Here Azaleas, Rhododendrons, Camellias, Kalmias, Magnolias, Clematis and similar species are being planted by the roadside or in the small clearings in the rich loam at the base of the bluff. Broom and Gorse are being naturalized higher up the bank. One more sunny place, a hollow of rich, black peaty soil, has been occupied by a score of Fig-trees of different varieties and by clumps of Bamboos. Olives, too, have been planted—fifty trees in eleven varieties. It serves to illustrate the range of possibilities here, that on a wind-exposed point, not a hundred feet from where the Figs and Olives are thriving, a mass of close-set Pinus Austriaca has proved itself at home.

The middle plateau, where the Eucalypti and Acacias are chiefly planted, also contains the beginnings of a Palm collection, a Jacaranda mimosifolia (one of the Rosewood-trees), and a large number of tender trees and shrubs. The soil is a loose, rocky loam, warm, light, and needing no irrigation for trees set early in the season. The growth of Quercus Cerris and Q. Robur have been most satisfactory. The scarlet Hibiscus and the scarlet Passiflora, P. incarnata, have not shown a sign of injury in winter. The native growths are Quercus agrifolia, Rhamnus Purshiana, Juglans Californica, and large Elders, some of them thirty-five feet high, with trunks eighteen inches in diameter.

The second steep bluff, another hundred feet high, that lies between the middle plateau and the mesa, contains enough soil for trees and shrubs, and is being cleared preparatory to planting. This portion, as well as the top, requires great care to secure a tree-covering. It may be considered as fairly representative of an immense area of mesa-lands in California. The native growth is Rhus laurina, Rhamnus Purshiana, the so-called wild Coffee-berry of California, with Pæonia Brownii, Salvia spathacea, and the inevitable host of Compositæ. In spring-time the mesa is very beautiful.

Several rows of large Eucalypti border this upland; the middle portion of seven or eight acres is unplanted, except for some Ashes and Olives, which have done very well, and here, rather than on the lower plateaus, the first scientific effort at establishing a mixed high forest will probably be undertaken as soon as the soil is in good condition and the trees ready. The Cork Oak, Quercus Suber, has done so well in southern California, surpassing in rapidity of growth any other Oak, and Oaks are so well indicated by the native growth of the plateau that a grove of Cork Oaks will probably be placed there. But the more valuable species of Eucalyptus and Acacia seem to be more nearly adapted to the mesa.

The chief value of a forestry station on so small a tract must be on its arboretum side, and, fortunately, this station is so near Santa Monica and Los Angeles that a summer school of forestry, with popular lectures, would be well attended. Its importance as an educational centre in years to come cannot easily be estimated. If the National Government creates an adequate forestry system for maintaining and managing the present reservations in California and elsewhere, a place like the Santa Monica Station might in time offer many advantages for a school of forest-science.

Niles, Calif. *Charles Howard Shinn.*

New or Little-known Plants.

New Cypripediums.

CYPRIPEDIUM SALLIERI PICTUM.—This is a cross between a fine variety of Cypripedium insigne as the seed parent and C. villosum albo-marginatum as the pollen parent. The dorsal sepal is large and slightly reflexed at the base; the lower half is greenish yellow, heavily marked and lined with purplish brown, which on entering the pure white upper half becomes rich violet. The petals and pouch much resemble those of C. villosum. Only two plants of this fine variety are known in cultivation, one of them having its home in the well-known collection of Hicks Arnold, Esq., of New York.

CYPRIPEDIUM NITENS PITCHERÆ.—This variety of Cypripedium nitens is the result of a cross between C. villosum as the seed parent and a very fine variety of C. insigne as the pollen parent. The dorsal sepal is very large and broad, with a deep white margin. The centre part is light green, heavily marked with large spots of dark brown, some of them measuring from three-eighths to half an inch in length, and extending into the white margin, where they become violet in color. The petals and pouch resemble those of C. villosum, but are much finer in form and deeper in color. The crossing was done December 24th, 1891; the seed was sown June 19th, 1892, and the plant flowered January 23d, 1895.

CYPRIPEDIUM CALYPSO ROTHWELLIANUM.—This is a noteworthy hybrid, having for its parents Cypripedium Boxallii superbum as the seed parent and C. Spicerianum roseum as the pollen parent. The leaves are broad, about seven to nine inches in length, of a dark green color. The dorsal sepal has

a very heavy midvein of deep purple from base to apex, and the whole sepal is densely suffused with the same color, with the exception of a narrow white margin. The petals are slightly undulated, of a brownish purple color, with a heavy midvein of dark purple. The pouch is the same color as the petals, and the staminode is pale lilac, with a green spur in the centre. The plant was raised by Pitcher & Manda, at Short Hills, New Jersey, and named in honor of J. E. Rothwell, Esq., of Brookline, Massachusetts. The seed was sown January, 1892, and the plant first flowered in January, 1895.

Cypripedium Janus.—This is a distinct and beautiful hybrid between Cypripedium villosum superbum as the seed parent and C. Leeanum Masereelianum as the pollen parent. The leaves resemble those of C. Leeanum, only they are more erect in habit; they are from six to eight inches long and one and a half inches broad. The dorsal sepal is large and flat, with a broad white margin prolonged to the base; the centre part is delicate green, nerved with a darker shade of the same color, and heavily marked and spotted with blackish brown. The inferior sepal is pale green, veined with darker green. The petals are broad, with a heavy purplish brown midvein, the upper half brownish purple on a green background spotted with purple; the lower half is lighter in color and more densely spotted. The pouch is shiny, yellowish green, tinted with purple, veined and lined with dark green. The staminode is purplish green, having a bright green spur in the centre. The parent flower was fertilized October 23d, 1891; the seed was sown March 18th, 1892, and the plant flowered January 24th, 1895.

Plant Notes.

Semele (Ruscus) androgyna.—This plant is a native of the Canary Islands, and, although long in cultivation, is rare with us. There are a few plants in the neighborhood of Boston, which were undoubtedly brought from Fayal, where it is, of course, hardy, and is frequently planted. It is a greenhouse evergreen climbing shrub, closely related to Asparagus, and might be described as a huge Smilax, namely, Myrsiphyllum, entirely lacking the grace of its relative, but more than making amends for this deficiency by its bold and vigorous growth. At this season of the year, or a little earlier, stout stalks, resembling a large and much elongated Asparagus head, are thrown up, and, under favorable conditions, attain lengths of twenty feet or more; from these spring numerous branches which look like great pinnate leaves. The true leaves, however, are almost unnoticeable scales at the base of these apparent leaves or cladodes. Early in February the small white flowers are produced in large numbers on the margins of these false leaves, giving the plant a very singular, almost unique, appearance. The flowers are succeeded by round pulpy berries, not common with us. This Semele should be planted out in a well-prepared border of rich soil, in a cool greenhouse, and trained over a back wall or on the rafters; it is too rampant a grower to succeed in pots or tubs, unless they are very capacious. A well-established plant will furnish quantities of foliage admirably adapted to household decoration, particularly where bold effects are desired. The propagation is by seeds, which sometimes require two seasons for germination, and are not always easily obtainable, or by division, which is a slow and unsatisfactory method; these difficulties probably account for the scarcity of the plant in cultivation.

Danaë (Ruscus) racemosa.—This plant is not unlike Semele; indeed, they have both been known by the common name of Alexandrian Laurel, but the Danaë is less exuberant in its habits of growth. It has branching stems, and its general effect is more graceful, reminding one of some of the Bamboos. It grows three feet or more in height, and makes a good pot-plant; it can also be satisfactorily grown in a greenhouse border. The cladodes are lanceolate, an inch and a half or two inches long, of good vivid green, and well fitted for any decorative use which requires lasting foliage. The flowers are small, borne on the end of the branches, and are followed by bright red berries, which are occasionally produced here in limited quantities. The propagation is the same as in Semele. A recent article in *Revue Horticole*, No. 23, 1894, p. 545, gives a description of these two plants, and also of several species of Ruscus; none of the Ruscus, however, are desirable for ornamental purposes; they are simply curious and of botanical interest only.

Centropogon Lucyanus.—Mr. Cameron writes that this beautiful plant has been for some time flowering in a moderately warm greenhouse at the Harvard Botanical Garden. It was raised about thirty-nine years ago by Monsieur Desponds, of Marseilles, being a hybrid between Centropogon fastuosus, another good plant, and the Brazilian Sipho campylos betulæfolius. The plant has a half-procumbent habit, and the stems are clothed with oblong, lanceolate leaves. The tubular, rosy carmine flowers are borne at the ends of the branches. As a winter-flowering plant for the warm greenhouse this Centropogon has much to commend it. Its blossoms are not only showy, but a succession is kept up for a long time. The plants can be raised annually from cuttings taken in the spring. If the cuttings are placed in sand with a good bottom-heat they hardly ever fail to root. When rooted they should be put into small pots of light rich soil and shifted on as required during the summer. In spring the young plants need a rather warm greenhouse, but in summer a cool, moist, shady house or frame suits them well. Perhaps, in no better way are the flowers of this plant shown to advantage than when the plants are grown in baskets suspended from the roof. The drooping habit of the plant suits it admirably for this treatment.

Gynura aurantiaca.—This composite plant was introduced from Java about fifteen years ago. In a warm greenhouse this is its flowering season, but the plant is not grown so much for its flowers as for its beautiful foliage. It grows from two to three feet high, and its stems are well clothed with leaves from four to six inches long and three to four across, and these are furnished over their entire surface with small hairs of a beautiful violet color. The small flower-heads are produced in corymbs and are of a brilliant orange color. It is propagated by cuttings, which root easily, and the plant enjoys a light open soil and a warm greenhouse. With its beautiful stem and leaves it makes a plant which is useful whenever handsome foliage is wanted.

Thunbergia erecta.—This west African plant is, perhaps, better known in gardens as Meyenia. It is almost a constant bloomer, but flowers most profusely during the winter months, and at this time it is one of our prettiest of dwarf stove-shrubs. It is a much-branched plant, and when not pruned too hard has a graceful habit. The small, dark green, ovate leaves are set thickly on the branches, and even when the plants are not in flower they make handsome small bushes. The dark blue flowers are produced singly in the axils of the leaves, and are about one inch and a half long and about the same across. Young plants are obtained from cuttings of the young wood, which root easily at any time. The variety with white flowers is also in bloom now, and makes a good companion plant to the blue-flowered one. This Thunbergia and its variety thrives in a stove, where it will get a strong moist heat, and in a rich open compost.

Cultural Department.

Vegetables under Glass.

Forcing Beans.—No beans are better for forcing than the group known in European gardens as French, or Dwarf Kidney Beans. In this country we call them String Beans, but the term is very vague, and applies, apparently, to all beans whose pods are used for kitchen purposes. Several varieties of the Bush Lima and French sections have been in active growth here for some weeks past. Two varieties of the Bush

Lima, Henderson's and Burpee's, were sown in the same bench on January 2d. Under summer outdoor cultivation the Bush Limas are bushy in growth and seldom more than eighteen inches or two feet high. In the greenhouse, however, Burpee's Lima has become a true runner, and with few lateral shoots the main stems are already six feet in height, and are now developing a few flower-clusters toward the top. Plants of Henderson's, on the other hand, although sown at the same time, are only twelve inches high, and are showing some inclination to run, with no indication of flowers or branches. I am unable to account for this difference in these two varieties, and their change in habit of growth is likewise puzzling.

With the French, or Dwarf Kidney Beans, we have been more successful. These have been grown in pots and on benches, and for some reasons pot-culture is to be preferred. The plants in pots were sown December 5th, and we have been picking marketable pods from them since January 25th. The bench plants are just coming into bloom, and even with the increase of light and sunshine three weeks will probably elapse before they will be ready to pick. In the matter of earliness the plants in pots clearly have the advantage. The pots are convenient since they can be used to fill small vacant spaces which occur in most greenhouses from time to time, such as otherwise might go to loss. We use any ordinary potting soil that may be handy, loam largely predominating, and seven-inch or eight-inch pots, and sow about a dozen seeds in each pot. Later on the plants may be thinned out to half that number; but, as seedling Beans in greenhouses are

Fig. 9.—A Red Cedar in Eastern Pennsylvania.—See page 61.

subject to damping-off fungi, it is advisable to sow a few extra seeds in each pot. A high temperature, not lower than sixty-five at night, is the best, and where the plants are grown for more than one gathering of the fruits, they should be watered occasionally with weak liquid-manure after the first picking has been made.

In cultivating Beans on benches we sow the seeds in lines about eighteen inches apart, afterward thinning out the plants to two or three inches apart in the rows. The damping-off fungi and red spider are the most destructive enemies of these plants under glass. Moist soil and atmosphere encourage the growth of the fungi, and the same conditions keep the red spider in check. We have found, however, that sulphur or powdered charcoal, scattered among the plants, will retard the injurious effects of the fungi, and a diluted kerosene emulsion, applied frequently, destroys the red spider.

We have grown three varieties of these French Beans—Emperor William, Early Warwick and Syon House. Early Warwick is a very good sort, producing a good crop, somewhat in advance of the others. The growth of Emperor William is weakly, and the crop poor; but Syon House is, by far, the best of all for general purposes; it is strong and healthy, and produces a large crop of excellent pods.

Tomato Ignotum.—This excellent variety is an admirable cropper out-of-doors, and is, perhaps, the best Tomato for forcing. The fruits are of good size, smooth and handsome in appearance and of excellent flavor. Large tomatoes are liable to crack, and whatever other good qualities a tomato may have it is comparatively worthless if it cracks. The Ignotum never cracks, and yet the skin is neither so thick nor so tough as is that of many tomatoes that do crack. We have one house almost exclusively devoted to this Tomato, and the crop has been uniformly excellent. The plants are mostly grown to a single stem, and one such plant has already produced two pounds of first-class fruit, with good promise of three pounds additional. It may be added that a single fruit on this plant weighed eight and a half ounces. The Ignotum was a chance seedling from a small German variety found on the grounds of the Michigan Agricultural College by Professor L. H. Bailey some five or six years ago. It has been offered by the seedsmen each year since 1890.

Cornell University. *M. Barker.*

Violets.

If there was as much certainty of success with Neapolitan Violets as with many other florists' flowers, they would be abundant and cheap, but the difficulties attending their cultivation will always make them highly prized flowers. They simply need a good soil, with some proportion of lime in its composition, and sunshine and all the air possible during winter-time. A comparatively low night temperature of thirty-five to forty degrees, Fahrenheit, will give a long season of bloom with large flowers, though not many at a time. With a temperature of forty-five to fifty degrees the flowering season will be shorter, with an enormous crop during January and February. If we may consider the normal temperature of these plants to range from forty degrees down to almost freezing-point, it follows that they are forced to a certain extent whenever they are grown in a temperature above forty degrees. Violets in frames are frequently subjected to a few degrees of frost, and when kept screened from the sun's rays until they are thawed out the plants do not suffer. Some of our best growers use frames altogether, and, except for the misfortune of disease, have been generally successful, especially with Marie Louise.

Damping in frames has always been a source of trouble. This is a kind of black mildew, which quickly spreads if the plants are not carefully looked over every day or two. The largest and healthiest plants are almost always the first to be attacked. It is difficult in winter, especially with frames, to air sufficiently, and the disease spreads quickly if the frames are closed for a day or two, as often happens during a period of bad weather. A dry atmosphere seems essential. Some growers use a mulching of dry horse-litter, well rotted, composed mostly of droppings. This, it is claimed, takes up the surplus moisture given off during the night and when the frames are closed, liberating the moisture when the frames are opened. No doubt, this would act beneficially in reducing the danger of damping, if air could be given every day. Other growers use dry sand with the same object. If it does no more, it makes a clean cover for the ground and keeps the flowers from soiling. This practice we follow here, and I have noticed that the sand is moist in the morning, and quickly becomes dry during the day when air is given. When the Violets have been poor I have tried everything that promised to be of benefit to them; among other things, powdered charcoal and sulphur. I still think this was effectual against disease, but objectionable on account of the odor.

The Marie Louise is the most popular of all the Neapolitan Violets. It is, however, the most difficult one to grow, and Lady Hume Campbell is now very largely grown in its stead. The color of the latter is blue rather than violet, and mauve would be, perhaps, the most correct designation. The popularity of the violet shade seems to be all a matter of taste, and unexplainable in any other way. The tone of the Lady Hume Campbell is decided enough.

A gardening acquaintance of mine is having wonderful success with Marie Louise grown in pots in the greenhouse in a night temperature of about fifty degrees, but for one grower who succeeds on this line a dozen fail. To chronicle the various methods of different cultivators who have succeeded would take up much space. Some grow in pots, others in frames; some in light soil, and others in heavy; some in shade, and others in sunshine; some in a greenhouse with Carnations, at a night temperature of fifty degrees, and others in a temperature very little above freezing. The successful plan of one year too often fails the next. I have tried about every way I could think of. I have potted rooted runners from the bed in February, thoroughly hardened them off, and planted them in May in specially prepared soil, with lime and soot worked in. The result was a splendid growth until August, when the spot attacked them. The sight, and smell for that matter, of these diseased plants was so distressing that I have taken another path rather than pass by them. I started the next season with fresh stock which never had been diseased. I was informed that a successful grower divided his plants, so I tried this plan, but succeeded no better; I think dividing the old stools the worst plan of any, for if any disease lurks on the foliage or the roots it is apt to be perpetuated in this way. This is especially the case with the nematodes, sometimes called club-root. It is said to be the work of a small worm, which makes a gall on the root about the size of a grain of mustard-seed. The work of the nematodes is so insidious in its character that plants will thrive, appearing healthy and even vigorous. But the plants, when taken up in the autumn and put into frames, scarcely ever bloom, and gradually dwindle away. Curling, scorching leaves are a sure indication that the pest is at work. According to those who have made a special study of this pest, some of its species are common in most gardens, especially such as have been under cultivation a long time. I find it on Begonias, Salvias, Asters, Heliotrope, Abutilons, Roses, Lettuce, Cucumbers, Melons and Tomatoes, and I have also found it on many weeds. It appears that to avoid this disease we should select a piece of new ground. Information as to how to prepare ground so that it would be free from germs would be valuable. Rotation of crops might work to this end, if we only knew which are pest-proof. In preparing soil for Violets last season I adopted the plan followed by Mr. Montgomery, of the Waban Rose Conservatories, of heating the compost with fermenting materials, bone-meal being the principal agent. The temperature thus attained is such that all insect life is destroyed.

When I imported Lady Hume Campbell, four years ago, it was so badly infested with nematodes that I had some difficulty in saving it. The flowers were poor in size and color, compared with those now in bloom. Gradually, however, by taking cuttings instead of runners, as I had formerly done, I brought them into a healthy condition. This season they are very fine, and average 1,000 blooms a week on 208 plants, last week giving 1,200 flowers.

Last June I thoroughly cleared the bench and lime-washed it, and being sure that the compost was free and the stock healthy, I planted on the 10th of that month. The sashes are removable, and the plants remained exposed to the full sun during the whole summer. I gave them an abundance of water when well established, but no stimulants. They made splendid growth, and never showed any trace of disease. Some stock which was left over from the year before was planted with a doubtful lot of Marie Louise in the vegetable garden, and showed disease. As a preventive I used two gallons of prepared Bordeaux mixture during the most dangerous months, August and September. Whether I owe anything to its use I do not know, but this I can say, that on the diseased plants in the garden those sprayed were as badly diseased at the end of the season as some few plants which were left unsprayed, for experiment. My conclusions on the application of copper compounds are that they may be excellent preventives, but of no use where the disease has got headway. It ought to be generally understood that it is not claimed that the copper compounds are curative, but only preventive—that is, they will not kill the fungus which is at

work within the plants, but when healthy plants are covered over with a thin coating of the mixture the spores of the fungi will not germinate and infect the plants.

The Messrs. Farquhar, of Boston, state that their new Violet is a sport from the Lady Hume Campbell. If so, it is an acquisition. I have examined it, and, so far as I have seen, it is healthy. The flowers are much larger than those of the Marie Louise, and of identically the same shade.

Wellesley, Mass. *T. D. H.*

Chrysanthemums.

THE propagation of Chrysanthemums must begin at once if good strong plants are desired. The first essential is the selection of good cuttings, and this does not mean large soft shoots, which are harder to strike, and after they are struck throw up a soft weak growth, from which good blooms cannot be obtained. A firm, short-jointed cutting, although smaller at first, will in every case make the best plant in the end. Another mistake is to strike the cuttings in too much heat, and in this way a great proportion of Chrysanthemums are ruined at the very outset. A temperature of forty to forty-five degrees at night is quite high enough. The cuttings may be struck in a propagating-bed in sand, in boxes, or singly in pots, in a light sandy mixture. The pot method, where space can be spared, is, no doubt, the best, as the plants receive less check in shifting, and this should be avoided in the first and in the successive shifts. The main point in Chrysanthemum-culture is to keep the plants growing continuously, and they should never be allowed to be checked through any cause; they should have free exposure to light and air and the general conditions which will induce free, but firm, growth.

Tarrytown, N. Y. *William Scott.*

Winter-flowering Begonias.—Young plants of these Begonias, from spring-struck cuttings, have with us proved better than old plants, as they flower more freely and throw better blooms. The cuttings are struck in February, and kept growing freely under glass until August, when they are removed to a cold frame. The pots are plunged in ashes or leaves and gradually exposed to air and sunshine. Finally they should be left uncovered by night and day, so as thoroughly to ripen the wood. They should be moved inside before danger of frost. They bloom profusely all winter through in a light airy house with a temperature of fifty-five degrees at night, allowing a rise of fifteen degrees by sun-heat.

Tarrytown, N. Y. *William Scott.*

Correspondence.

The Saghalin Knot-weed.

To the Editor of GARDEN AND FOREST:

Sir,—Wide publicity has evidently been given to the short note I published in GARDEN AND FOREST of October 11th, 1893, on Polygonum Sachalinense. These observations were simply as to its remarkable growth for a period of twelve years here at the college under all conditions. It spreads so freely by its underground stems that it may be an extremely pernicious weed, as some other members of the genus Polygonum are in the west, notably P. Muhlenbergii. Land set aside for "Sacaline" may have to be given up forever to it, just as in the case of Johnson Grass in the south.

As to its feeding qualities there may be question; as yet no one in this country has tested it, and I understand there are some unfavorable reports from Europe. Corn will still continue to be the best forage-plant in the Mississippi valley. I do not believe that any plant, whether used for ornamental purposes or in horticulture or agriculture, should be recommended for general or extensive use until it is sufficiently tried under all conditions, climate and adaptability to soil.

Agricultural College, Ames, Iowa. *L. H. Pammel.*

[We observe that GARDEN AND FOREST has been referred to in several circulars as having advocated the use of this Knot-weed as a forage-plant. Two years ago, when the eminent French horticulturist, Monsieur Charles Baltet, reported the enormous growth of this plant, our London correspondent referred to it as a matter of news, and we afterward stated that a near relative of this Polygonum, P. cuspidatum, a plant which had also been commended for its economic value by some European authorities, had proved an aggressive weed in Central Park. However, we suggested that it would be worth while to try these Polygonums where no other forage-plant will grow, although it was added that we did not think it probable that they would ever supersede Indian Corn in the Corn belt of this country. It is wise to test any plant which comes well recommended, but we agree with Professor Pammel that it is not safe to be confident about the value of any novelty until it has been thoroughly tested.—ED.]

New Orchid Baskets and Plant Tubs.

To the Editor of GARDEN AND FOREST:

Sir,—When visiting the greenhouses of Mr. Adolph Schoeninger, of Chicago, some time ago, I was impressed with the neat appearance of his collection of Orchids. There were no unsightly baskets or ugly pieces of half-rotten or charred wood, which too often annoy the eye in such places. Most of these Orchids are grown in neat baskets suspended from the roof or on benches, in cylinders and on flats of different sizes and design. Not being satisfied with the square baskets so commonly in use, Mr. Schoeninger constructed for his collection different styles of baskets and rafts, using at first cedar, pitch-pine, maple, cherry and other woods, but at last decided upon the wood of the southern Cypress, which is almost as durable as red cedar and much cheaper. For such plants as are usually grown on pieces of wood or cork, rafts were constructed, made of octagonal strips of cypress wood, pierced with holes through which runs a copper or galvanized wire. The strips are kept apart by turned buttons of the same wood. The Orchids on these rafts are growing in sphagnum moss and Fern-roots, and are fastened to the bars of the rafts by wire. Epidendrums, several Dendrobiums, Stag-horn Ferns and a number of Bromeliads are grown on these flats. Through the pliability of the wire the sides of the rafts can be turned up so that they assume a boat-like form. Filled with crocks, charcoal, peat, Fern-roots and sphagnum moss, they serve, in this way, the same purpose as the common baskets. In these boat-shaped appliances many Orchids, Tillandsias, Pitcairneas, Billbergias, Caraguatas, several species of Æschynanthus and Peperomia can be grown successfully in a warm, moist house. Larger flats can be turned into cylinders, and in this way they are excellent receptacles for Vandas, Ærides, Angræcums, etc.

Most of the Cattleyas, the large-growing Dendrobiums and many Lælias, however, are grown in pot-like baskets, which are also constructed of cypress wood in sizes from four to twelve inches across. The roots find an excellent hold on the numerous bars on whfch they run up and down in tangled masses. Besides their neat appearance, the peculiar shape of these baskets induces the plants to root freely, giving them an advantage over the baskets in which Orchids are generally grown. Another advantage of these baskets is that they can stand on the benches like flower-pots, or they may be suspended from the roof like other baskets. They have movable bottoms, which are firm when in position.

Mr. Schoeninger, who is an enthusiastic amateur gardener, spends much of his leisure time in his greenhouses, trying to grow his plants into healthy specimens. Being dissatisfied with the clumsy appearance of the common tubs where Palms and other large-growing plants are usually grown, Mr. Schoeninger invented a new, neat and simple flower tub, which has also the advantage of being very durable. Instead of the common hoop, a strong copper or galvanized wired is used, which runs in a groove around the staves. The ends of the wire are fastened neatly under the handle by the turning of a nut. The handle is so constructed that the small tub can be lifted by hand; in case of larger ones, sticks can be placed under the handle, thereby allowing any weight to be lifted with ease. Cast-iron feet are attached to keep the tub from the floor, allowing also a free circulation of the air and a good drainage. There is a neatness about these tubs and baskets not found in any other I am acquainted with. They are also exceedingly cheap.

Milwaukee, Wis. *H. Nehrling.*

Meetings of Societies.

Nebraska State Horticultural Society.—III.

OUR report of the successful annual meeting of this society concludes with abstracts of two papers on Grape Growing:

THE MANAGEMENT OF VINEYARDS.

A paper by Professor F. W. Card on this subject began with suggestions on the selection of a site, which he said was more important than that of soil. Any open or well-drained soil will

answer, but the familiar phrase, "vine-clad hills," indicates that high lands have been recognized always as the natural home of the vine. This is because such situations are warm and dry, and in our climate they are less subject to late spring frosts, owing to the fact that they have what may be called good atmospheric drainage. Cold air settles into the lowest places, and the high knoll may often be above a cold stratum of frosty air in the valley below.

Analysis of the grape made in California shows that a crop of three tons of grapes to the acre takes from the soil thirty pounds of potash, a little more than nine pounds of phosphoric acid and a little more than ten pounds of nitrogen. This shows that about three times as much potash is used as either of the other ingredients. The ingredients of stable-manure are out of proportion to the needs of the grape, and it should generally be supplemented with potash of some kind. Stable-manure should be used with caution on thin land, and applied late in the fall or early in the winter, so that it will be available for early spring use. When applied in the spring there is danger that it will induce a late autumn growth and render the vine liable to injury in winter. An essential preliminary in the preparation of the ground is deep and thorough cultivation, and it seems to be the experience in most grape-growing regions that deep planting is better than shallow planting. Ten inches is generally recommended as the proper depth for planting throughout the grape-growing regions of western New York, and some growers advise as deep as twenty inches even in heavy soils.

In most cases the question of fertilizing the blossom is not an important consideration in planting, but such varieties as Brighton and Rogers' Hybrids must be planted near other sorts which will pollenize them. Some growers advocate that future efforts in the production of new varieties should be in the line of separating the sexes, as has been done in many of the Strawberries. It is said that the production of two crops, one of pollen and another of fruit, is too severe a tax on the energies of the vines. Besides this, pollen grown from male plants is said to be larger in grain and more potent than those from perfect flowers. Whether this division of labor should be encouraged may be questioned, but the character of the individual varieties in this respect is worthy of attention always, and especially in estimating the merits of a new sort.

After the vines begin to bear, of course, cultivation should never be neglected, especially in dry seasons. It is an advantage to have the soil covered with some growing crop in winter if this can practicably be done. The best crop for this purpose is one which will start late—not earlier than the middle of August—and make a rapid growth before cold weather, so that it will form a good covering for the winter. Wherever the winters are sufficiently mild, Crimson Clover seems to give the best satisfaction for this purpose, and in the west and north-west, perhaps, the common Field Pea approaches nearer the requirements than any other plant. Crops which can be put into the vineyard early in the season would rob the soil of much of the moisture which needs to be so carefully husbanded for the grapes, but if the vineyard has been thoroughly tilled during the early part of the year the injury from the late crop will be slight, and by the time the green crop will make any serious draft on the moisture of the soil the fruit is off and the vine should have ripened its wood for the winter. Professor Card's address concludes with an elaborate description of the various methods of pruning and training.

THE RELATION OF CLIMATE TO GRAPE-GROWING.

An interesting paper on this subject was presented by Professor G. D. Swezey. Last year he was able to trace a close relation between the amount of rainfall during the growing season and the yield of the apple-crop. He was not able to trace such a relation between the rainfall and the grape-crop, however. Indeed, a wet May is unfavorable to the grape-crop, by giving better conditions for the growth and propagation of fungi. Severe winters have, in some cases, caused the destruction of the crop even when the vines have been laid down and covered. Spring frosts, however, are the worst climatic enemy of the Grape. The conditions favoring a frost are the absence of wind and clouds and the continuance of a low temperature for some hours. Nearly all the temperature observations at the United States Weather Stations are taken on the top of buildings at a considerable distance from the ground. At the station at Lincoln the thermometers are seventy-five feet above ground. For a period of thirty days during the last of October and the first of November, comparisons were made between the temperature at this point and at the ground. Once during that time there was a difference of twelve degrees between the minimum temperature on the roof and at the ground. A difference of six or more degrees was found on seven out of the thirty mornings. One of the chief effects of wind is in mixing the upper and lower layers of the atmosphere which prevents this excessive cooling of the lower layers. A moist atmosphere is one of the conditions which tend to prevent the occurrence of frost. The moister the atmosphere the higher the dew-point, and if the dew-point is above thirty-two degrees, so that dew begins to be deposited before frost comes, this is likely to prevent its occurrence altogether, for in the change from vapor to dew heat is constantly given off. This is one of the reasons why frosts are more common in the dry interior climates than in the moister eastern ones. The building of fires in the vicinity of the vineyard when frost is imminent is of value in two ways: by forming a cloud of smoke and thus preventing radiation, and by stirring up the atmosphere by the formation of upward currents of air.

Western New York Horticultural Society.—III.

THE following is a continuation of the proceedings of the late meeting of this society at Rochester:

NOTES ON ADULTERATIONS.

Dr. L. L. Van Slyke, of the Geneva Experiment Station, gave some instructive notes on the ways in which chemical adulterations affect the interests of fruit-growers. He spoke of the use of tin containing considerable quantities of lead, and thought influence should be brought to bear to have canners use only the better quality of tin, especially with the more acid fruits and vegetables, such as tomatoes, because of the danger of dissolving the lead. This also applied to the solder, as the more lead there was the more easily it melted, and hence solder containing much lead was often used. He drew attention to the higher color of French peas, due to coloring by copper. He also spoke of salicylic acid used for preserving fruits, which, though not a poison, is an irritant to the stomach. In unfermented wines alcohol is often added to preserve them, and vinegar is diluted with sulphuric acid and water. In the case of jams and jellies a cheaper material is often mixed with a more expensive one, and the whole sold under the name of the more expensive. For jams refuse material is often used, and many fruit jellies are made without any fruit, even for the flavoring. Among many samples examined, one of quince jelly was composed largely of beet-sugar and glucose, with flavoring composed of acids. Of thirty-two jellies and jams examined, twenty-nine were adulterated. A large number of the fruit essences are adulterated, especially pineapple.

In discussing the relative delicacy of tests for copper in solutions, Dr. Van Slyke said that the first test was that given by an excess of ammonia in a solution containing copper, thus producing a blue color. It will show one part in 25,000 parts of water. Potassium iodide gives a yellow tinge to a solution containing one part copper to 50,000 parts of water. Potassium ferrocyanide, as used in making Bordeaux mixture, detects one part in 400,000 parts of water. Potassium zanothate (a chemical seldom found outside the laboratory), added to a copper solution, will give a dense yellow color that will show in a solution of one part copper to 800,000 parts of water.

The most delicate test of all is that made by immersing any ordinary needle, wrapped with platinum wire, in a solution containing copper. An electric current will be set up and the copper will be deposited on the wire. The ferrocyanide test is so delicate that if it is properly used in making Bordeaux mixture there will be no copper left to hurt the foliage. The ferrocyanide should not be poured into the mixture until after the lime has been thoroughly stirred in.

An investigation was made concerning the relative quantities of potash and phosphoric acid required by fruit-trees, fruit and nursery-trees. As an average each tree used one and one-third pounds of potash for one pound of phosphoric acid. The fruit averaged four pounds of potash to one of phosphoric acid, while nursery stock required sixteen and a half pounds of phosphoric acid to thirty pounds of potash to the acre, the extremes of phosphoric acid being from ten to twenty pounds, and of potash seven to forty-eight. From the above it will be seen that the orchardist needs to use a larger proportion of potash than comes in ordinary commercial fertilizers. He had written to a large number of firms for prices on single fertilizing ingredients, and found most of them willing to sell these separately, though generally recommending their mixed goods. He advised buying dried blood in Chicago, as it was less liable to be adulterated than after it had been sent to New York, where large quantities of leather scraps mysteriously disappear presumably into dried blood.

A PRACTICAL VIEW OF SPRAYING.

Mr. Albert Wood, of Orleans County, said he had an orchard of twenty-five acres on a gravelly loam. The trees were too close at two rods apart. The shaded ground became mossy; the red apples showed little color. He went through the orchard and cut out every other tree six years ago, since which time he has cultivated and fed those that were left. In 1893 he sprayed two trees; on these the apples were good, while most of the others went to the dry house. On the 20th of April, 1894, he sprayed his orchard, except fourteen trees left for comparison, with twenty pounds of copper sulphate, four pails of lime and 150 gallons of water. He sprayed again as the buds were swelling, and again when the apples were half an inch in diameter. About this time the apples on unsprayed trees began to drop. With the last two sprayings he used Paris green—one pound to each 150 gallons of water. On the fourteen trees not treated the foliage was rusty. The thirty-five barrels of fruit he picked from them shrank five barrels between picking and selling. Of the 2,000 barrels of treated fruit the shrinkage was not five barrels in the same time, and they brought thirty-eight cents more a barrel. On a Strawberry Apple-tree that had not had a perfect apple in nine years every apple was sound. Similar results were had with King, Baldwin and Twenty-ounce trees. Of Roxbury Russets three-fourths of the untreated apples were ground for cider, while most of those treated were good. Roxburys should have five sprayings a season.

Pears were treated in the same way as the Apples. Some Virgalieus had borne no perfect fruit for twenty-five years, and this year, when sprayed, there was no imperfect fruit. His results showed ninety per cent. gain by spraying. In a young orchard-row not treated the leaves fell three weeks earlier, and the foliage was not as heavy as on the sprayed trees. He had similar results with treated and untreated Cherry and Plum trees. From Fay's Currants which had been sprayed he picked fruit twenty days after others were gone. He thought the Bordeaux mixture should be applied as a mist, and that the Vermorel nozzle was best except for the higher trees, where the McGowan was the best. A tree should be sprayed till it drips. You cannot throw Bordeaux mixture far when reduced to a fog, and, therefore, for large trees long bamboo-poles must be used to hold the nozzle close to the foliage. He used 900 pounds of copper sulphate for thirty days' spraying.

PEACHES AND APRICOTS IN WESTERN NEW YORK.

Mr. Nelson C. Smith, of Geneva, said that these fruits could be successfully produced with proper study and care. It will not answer to trust to luck for fine fruit, and fancy fruit alone brings fancy prices. It is a greater drain on a tree to produce two bushels of second quality fruit than a bushel of extra-fine fruit. When the trees have done their work, it is necessary, if the highest price is secured, to pick the fruit at the critical moment when it is just ripe enough, but not too ripe, and then it must be packed in small, neat packages.

The soil best adapted to Peaches is a rich mellow loam with a clay subsoil, preferably high and rolling, near large bodies of water. Half of the previous season's growth should be shortened in every year and cut so as to make a fine-shaped head and kept well supplied with bearing shoots. At six or seven years old it will not need severe cutting.

The thinning is the most neglected of all the operations of Peach-growing. The fruit should be thinned to five or six inches apart. Some persons believe it costs too much to thin, but the fruit must be picked some time, and in this instance the early picking more than pays in the increased value of the later one, not to speak of the saving of strength to the trees.

Apricots are now known to be hardy on the eastern bank of Seneca Lake, and they are considered better than California fruit. The Early Golden has produced fifteen crops in twenty years. The so-called Russian varieties are no more hardy than many others, and are poor in size and quality. Apricots need a dry soil and treatment similar to Peaches. The essentials for success are a good location and soil and persistence in fighting the curculio. It requires judicious marketing and pluck, if any fruit does. It demands severer thinning than any other fruit, for if the fruit is allowed to remain this will check the growth of the tree, and the fruit-buds are formed on the new wood. Myrobalan and Marianna stocks are best on heavy soils, and Apricot for light soils.

To a member who asked why his Duchess pears rotted in the ice-house in September, Mr. Barry replied that the trouble was usually caused by picking too early. He considers it best to leave Duchess, and even Anjou, on the trees until the third week in October—that is, to leave them on as long as possible. When they are picked too early they shrivel. Mr. Bell thought it better to leave Duchess pears on the tree even till a frost touches them than to pick them before the second week in October. Light frost will not injure them. Mr. Morrell, of the Michigan State Horticultural Society, said that trees well fed with phosphoric acid and potash will hold pears two or three weeks longer than those not so fed, and the pears will grow wonderfully during that time.

In answer to a question as to how to build a cold-storage house, Mr. Lyons described some successful ones as having brick or stone walls for a part of their height, with a double-boarded frame of eight-inch studs above, the space between the boards being filled with sawdust, and the whole then ceiled inside and out. There are no air-spaces in the brick wall. The buildings are cooled by opening and closing the doors and windows in accordance with the outside temperature. Mr. Boag, of Batavia, spoke of his having two sixteen-inch walls of stone, with a two-inch air-space and double floors. There were ventilators at the bottom and in the roof. Two years ago he kept apples till May in good condition, while many had trouble with mildew.

Mr. Woodward had fruited the Crosby Peach two years. The trees were productive and ripened fruit a little earlier than the Smock and after Late Crawford. This peach has a small pit, fair flavor, and is not large, but fairly handsome. The tree is a poor grower. On the whole, he is well pleased. Another member stated that all the fruit-buds on Crosby trees were killed in his orchard, but this was also true of other varieties.

Recent Publications.

A Practical Flora for Schools and Colleges. By Oliver R. Willis, A. M., Ph. D., New York. American Book Company.

What Dr. Willis means by a practical flora is explained in the preface of this book to be one which "shows the practical aspects of the vegetable world and its relation to the needs of every-day life, for the purpose of engaging the interest and the enthusiasm of such pupils as do not have the scientific mind which makes the acquirement of the science an end in itself, nor the poetic temperament required for the love of the study for itself." In carrying out his design for arousing effort on the part of students whose mental endowment is somewhat restricted, Dr. Willis has added to the ordinary scientific description of plants generally found in school botanies some account of the economic features and the history of the different species. Since there are few plants which do not have some qualities which are useful, or hurtful, or ornamental, it is evident that the selection of these so-called practical notes should be very carefully made if the work is to have any proportion or symmetry, especially since the flora and its practical annex are contained within the limits of three hundred pages. In this selection we do not think that Dr. Willis has been altogether happy. Sometimes he goes into details which hardly seem attractive to the boy who does not love science for its own sake, as, for example, when he states that opium, the product of the Poppy, "is a very complex substance, containing a large number of bases in combination with sulphuric and meconic acids. Morphine, whose formula is $C_{17}H_{19}NO_3$, and narcotine, whose formula $C_{22}H_{23}NO_7$ are the most abundant and important," and to these he adds the formulas of codeine, thebaine, papaverine and narceine, which need not be repeated here. Excursions like this into the realms of organic chemistry might easily make a very large and repulsive work for pupils with no hunger for exact science, but at times these notes are much more popular as, for example, when he states that "no other small fruit is more generally cultivated than the currant, which is not only grown in the gardens of the rich, but is also to be found in the planted ground of the most humble cottager." The information that for "pies, puddings, dumplings and preserves the peach has no equal," does not err in being too profoundly scientific, nor do recipes for making apple butter or quince preserves. In other words, Dr. Willis's practical flora is encumbered

with much information which young pupils in botany cannot digest and assimilate, a great deal more that they do not need to be told, and very little which cannot be found in better form in the nearest cyclopedia.

Notes.

We have received a series of twenty pictures from different points of view of Mr. S. C. Nash's water-garden at Clifton, New Jersey, which has often been mentioned in this journal. These prints are from photographs taken by Mr. Nash, and they have been reproduced by the photogravure process, so that none of the delicacy of the photographic detail is sacrificed. The pictures not only give a good idea of such plants as the Victoria regia, the various Nymphæas and Nelumbiums, but they convey instructive hints to any one interested in aquatic gardening, especially in the important matter of planting along shores, and thus furnishing a proper setting for lakes and ponds. Mr. Nash has a few extra sets of these views which he will dispose of at less than their original cost.

In *Meehans' Monthly* for February the sound advice is given to dig a trench before spring growth begins around large trees which are to be moved. The inside of the trench should be two feet from the butt or more, according to the size of the tree. It should be deep enough to cut off most of the roots, two feet at least, and the trench should be carefully filled up with good soil, which should be firmly packed about the ball. Next autumn many new roots will have been formed, and the transplanting of the tree will be much more easy and more certainly successful. When the trench is dug, the top of the tree should be pruned back, though not as severely as if the planting was to take place immediately. Mr. Meehan says that some large Scarlet Oaks and American Beeches treated in this way last winter made a very remarkable root-growth during the following summer.

The literature of spraying is becoming very extensive, and no one who wants to apply remedies against insects and fungi in this form need lack for information. Bulletin No. 74 of the Geneva Experiment Station gives a very complete account of the machinery for this purpose, but it is said that better machines are still needed. For Potatoes and Tomatoes a nozzle should be used which can be lowered between the rows and directed so as to spray up through the vines. The same sprayer should not be expected to do all kinds of work with equal satisfaction. The agitator, which keeps the mixture of uniform strength by preventing the heavier ingredients from settling, is one of the most important parts of any sprayer and one which works up and down like a churn dash is the best. Pumps for spraying should be made of brass, or should be brass-lined, and when the piston-head is packed the packing should be frequently changed.

A writer in a recent number of the *Gardeners' Magazine* gives an interesting account of the cultivation of Kent Cobnuts. The particular orchard, if such it can be called, which he describes, covers something like sixteen acres, and was carrying, at the time of the writer's visit, about thirty-two tons of nuts. Some of the trees on this farm are seventy-five years old, and in the rich deep soil of West Kent the stems of many of them are eighteen inches in diameter and gnarled with age. These trees are usually called basin-shaped, but an ordinary sugar-basin with a short stem more truly represents their shape. The stems are from fifteen to eighteen inches high, and the branches radiate from these in an outward direction to a distance of from four to seven feet on each side, and by a perfect system of training and pruning they form a complete circle eight to fourteen, or even more, feet in diameter. The trees are trimmed to a flat top some five feet high, and to one looking across the great plantation not a branch is seen above this line. By summer and winter pruning these trees are kept in this shape, and the branches are closely covered with spurs, from which the nuts are produced. No suckers are seen, and something like three hundred trees may be grown on an acre, but the number varies according to the size. Many of the trees will produce ten pounds of nuts.

In the autumn of 1893 we mentioned the fact that the so-called Rose-colored Calla, Richardia Rehmanni, had flowered in Holland, and that the spathes as they appeared there were described as white, tinted with rose. In one of Mr. Watson's letters of January of last year it was stated that a colored picture of the plant as it grows in Natal showed that there is a variety of the plant there with spathes of dull rose-purple. In October last we gave an account of the flowering of the plant in Kew, where it showed nothing more than a flush of rose-color inside of the upper portion of the spathe. The last number of *The Garden* gives a picture of this plant in flower from a photograph sent from Holland, from which the appearance of the plant is shown to be quite different from the ordinary Calla, although it is a true Richardia. The distinct feature of the plant, as we have noted, is the lanceolate form of the leaves, which resemble somewhat those of a Canna, and the spathes are striped, as they unfold, in a way which reminds one of Jack-in-the-pulpit. The color of these stripes is said to be chocolate-brown, while on the inside the spathe is said to be a soft rose-color. It is suggested that the difference between the color of this flower and of the flower of the Kew plant may be due to the fact that one came from a much more southern latitude than the other. It is not improbable that the Rose Calla needs a hot sun to bring out its distinctive color, and it might do its best in our southern states. It is plainly less desirable than the white Richardias, and even than the yellow-spathed species. Nevertheless, it may be useful for hybridizing, and may found a race with a range of color quite distinct from any we now have.

At the semi-monthly meeting of the Massachusetts Horticultural Society, on February 2d, there was a fine display of cut blooms of Orchids from the Ames collection at North Easton, including first-rate examples of white forms of Lælia anceps, one called Vestalis being remarkably good, and another called Winniana, one of the darkest of all the varieties of this winter-blooming Lælia, was specially good. Mr. Robinson, the gardener, also showed a fine hybrid Cypripedium of his own raising, and named after Mrs. F. L. Ames, a cross between C. Fairieanum and C. tonsum, the latter being the seed parent. The hybrid showed plainly the parentage, having the characteristic petals of the charming pollen parent, with the shining surface over the whole flower that is so marked a feature of C. tonsum. Another hybrid raised in the same collection was shown, it being the North Easton variety of Cypripedium H. Ballantine, a charming little plant, having for its parents C. Purpuratum and C. Fairieanum. There were also a collection of cut blooms of Orchids from Mr. John L. Gardiner, of Brookline. Cut blooms of Camellias were also shown in quantity, chiefly by Francis B. Hayes, and made a fine display. The competition for the prizes offered for Violets was good, and the first prize was well merited by those shown by Mr. W. N. Craig, of Taunton, but the two vases of Marie Louise, shown by Alexander Mackay, of South Framingham, were, perhaps, the largest of their kind ever shown in Boston, the flowers easily covered a silver dollar, and the color was superb, eclipsing all other varieties on exhibition. There was also another promising kind, shown under the name of the Farquhar. A good display of Carnations was staged, the first prize going to the noted specialist from Framingham, Mr. W. Nicholson, and the second prize to Mr. W. N. Craig.

The second period of freezing weather in Florida was even more disastrous to the Orange groves than the first, when, as we have stated before, the crop of fruit was practically destroyed. The older trees, which had not been killed, had begun to put forth leaf-buds and fruit-buds, and this second cold wave has evidently destroyed these and apparently ruined the next crop. The cold weather has also hurt the crop in Spain, so that now nearly all the oranges in this market are from Sicily and Jamaica. From the latter island some very good fruit is coming, and this is here repacked in boxes like those used in Florida. The California orange season practically begins when the Florida season ends, in February, and continues through the spring months. Of course, the short crop elsewhere will make prices of California oranges high, so that this season's crop in that state will be unusually remunerative. The best California Navels which are now here seem to be of unusually good quality and they sell by the box for $2.50 to $4.50; good ones bring sixty-five cents a dozen. This unprecedented cold weather throughout the south has disorganized the vegetable market, and the supply here comprises hardly any fresh green vegetables besides the ordinary northern winter sorts and limited quantities of a few kinds from northern hot-houses. Hot-house tomatoes cost from sixty to eighty cents a pound; new carrots, forty cents for a dozen bunches containing five of these small but tender vegetables; radishes cost five cents a bunch, and tiny fresh onions the same price. Kohl-rabi, from Bermuda, rhubarb grown under glass on Long Island, and very slender stalks of hot-house asparagus, costing $1.25 for a small bunch, are other luxuries seen in the best markets. The heavy snows have seriously interfered with transportation, and the large supplies of kale and spinach which come from Norfolk, Virginia, have been cut off for the time.